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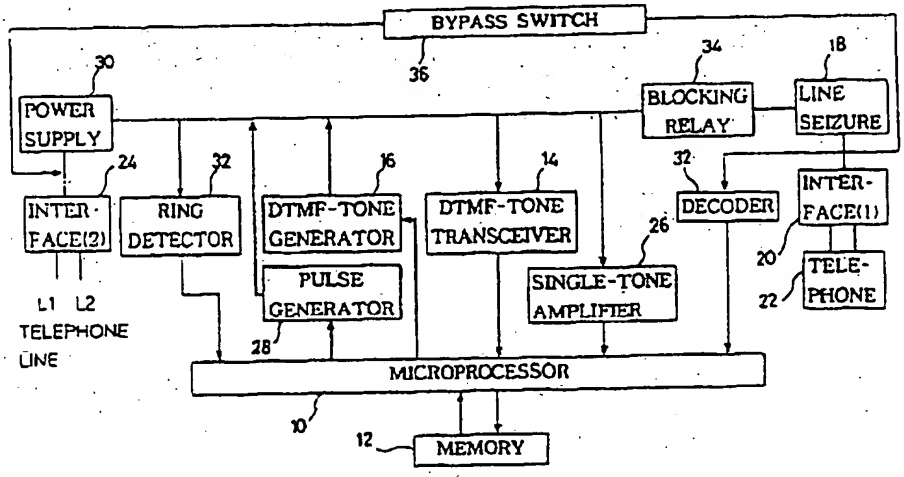

(57) Abstract

The present invention relates to a dialing device remotely programmable by way of bilateral communications between the device and a server system of a telephone service company at a remote location comprising: memory (12) for storing telephone service information data prepared by the service company; signal transceiver (14) for receiving signals from the server system through the telephone line and converting the received signals into binary data; microprocessor (10) for controlling a programmed process including a downloading process of storing or changing the service information data in the memory transmitted from the server system and an uploading process of transmitting the stored data in the memory to the server system through the telephone line; telephone line seizure (18) for seizing the telephone line to allow the programming process; and signal generator (16) for generating signals responsive to the data input from the microprocessor. In accordance with the present dialing device, a remote programming process including a downloading process and an uploading process can be carried out by way of bilateral communications between the dialer and the server system. The dialing and programming processes in the dialer can be made in a reliable and stable manner within minimal connection time.

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DIALING DEVICE

FIELD OF THE INVENTION

The present invention relates to a dialing device, and more specifically a dialing device programmable by way of bilateral communications between the device and a server system of a telephone service company at a remote site.

Description of the Prior Art

As many telephone companies develop various kinds of telephone services to use a long-distance call or an overseas call including internet phone, callback calling, prepaid calling service and the like, user can choose his preferred telephone service company in view of a quality of service and a billing system.

In order to make a call via his preferred telephone company, a user needs to dial a telephone number of the service company, number for identification information(billing number), a PIN number if any and finally a destination number. Since an identification number usually has 5 to 12 digits, the total digits including the destination numbers reaches 20 to 40. Accordingly, the user must be very careful enough to dial such long numbers without errors. If he makes misdialing of even one digit, he cannot get through to his destination number. To overcome these problems and inconveniences, telephone service companies provide with users an automatic dialing device which generates signals of predetermined numbers automatically.

US Patent No. 4,468,529 discloses a programmable automatic calling device connected to a plurality of telephone lines. An accessed telephone number, a response tone of a contacted computer and a billing code are programmable at the user's site by placement of the automatic calling device in a program mode. In the device, a separate actuation button is provided to start the programming process which should be made by a supervisory

personnel.

Further, US Patent No. 4,807,279 provides an apparatus which can remotely cancel or reprogram the call forwarding service such as the diversion of incoming call to new remote location. To reprogram or terminate the call forwarding service, the user can dial his own telephone number from the remote location and then "hang up" after one ring cycle. Upon sensing the half ring, the device captures the telephone line and dials out the number of the remote location. The user can then answer the automatically dialed call at the remote location and then reprogram the device by inserting a personal code and a new call forwarding remote telephone number or to terminate the call forwarding process. This apparatus aims at the diversion of call and reprogramming is still very complex or difficult.

In order to avoid an external power supply, US Patent No. 4,232,200 proposes an improved dialing device which provides automatic dialing of stored, frequently used numbers and the last number dialed. The device is basically powered through the line and has a supplementary battery. However, a capacitor type power supply may cause a shortage of power when a repeated operation of the device in very shortened intervals. Further, due to a large consumption of power, a sensitivity of a telephone may adversely be affected.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide an automatic dialing device which is programmable by a remote server system of a telephone service company to lessen a burden of user's cumbersome and complex programming process.

Another object of the invention is to provide an automatic dialing device which allows bilateral communications between the device and a remote server system.

Still another object of the invention is to provide an automatic dialing

device which is powered through the telephone line in a stable manner without necessitating an external or a supplementary power supply.

Still another object of the invention is to provide an automatic dialing device which minimizes time for connection.

Yet another object of the invention is to provide an automatic dialing device which can operate in response to various kinds of telephone exchange equipments.

In accordance with the present invention, there is provided a dialing device remotely programmable by way of bilateral communications between the device and a server system of a telephone service company at a remote location comprising; memory means for storing telephone service information data prepared by the service company; signal transceiver means for receiving signals from the server system through the telephone line and converting the received signals into binary data; microprocessor means for controlling a programmed process including a downloading process of storing or changing the service information data in the memory means transmitted from the server system and an uploading process of transmitting the stored data in the memory means to the server system through the telephone line; telephone line seizure means for seizing the telephone line to allow the programming process; and signal generating means for generating signals responsive to the data input from the microprocessor means.

BRIEF DESCRIPTION OF DRAWINGS

Fig 1 is a block diagram of a dialing device in accordance with the present invention;

Fig 2 is a schematic view of a power supply in accordance with the present invention;

Fig 3 and 4 are flow diagrams showing a programming mode in accordance with the present invention; and

Fig 5 and 6 are flow diagrams showing a dialing mode in accordance

with the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Turing now to the drawings, Fig 1 shows a block diagram of a dialing device remotely programmable by way of bilateral communications between the device and a server system of a telephone service company at a remote location.

The dialing device in accordance with the present invention includes a microprocessor 10 for controlling a programmed operation including a downloading process of storing service information and an uploading process of transmitting the service information stored in the device to the server system through the telephone line, a memory 12 for storing service information, a DTMF tone transceiver 14 for receiving signals from the server system through the line, a DTMF-tone generator 16 for generating DTMF-tone and transmitting signals to the server system, a telephone line seizure unit 18 for seizing the telephone line during the programmed operation. The dialing device further include an interface 20 for connecting the device to the terminal of the telephone 22 and an interface 24 for connecting the device to the telephone line L1 and L2.

In the present invention, service information is prepared by a telephone service company and is stored in the memory 12. By using a keypad in the telephone 22, a user or an authorized personnel may write the service information originally or change the information.

However, the service information often has a lot of data including access numbers of the server systems of the service companies, a standard table for distinguish a normal call from a service call, user's identification information including a PIN number if any, commanding codes and the like. Actually, it may be cumbersome or difficult for user to change the information correctly by pressing keys in the telephone. Accordingly, there remains a strong need to facilitate the programming process of the service information in

the dialer to relieve a burden of complex process for users.

When the telephone service companies provide the dialer storing their service information, they do not want as a matter of course that users change the information with their own. Further, the companies want to check on the service information data stored in the dialer regularly to prevent the dialer from a malfunction thereof. In order to adapt their service to changed circumstances such as a changed charge system in the specific area, the companies want to reprogram the service information of their customer's dialer.

To carry out the frequent programming process automatically, it is necessary that the programming process should be made between the server system and the device. To change the service information stored in the memory 12, the server system of the company makes a call to the user's telephone number and downloads the changed service information to the dialer to reprogram the data stored in the memory 12(downloading process).

In order to check on the service information stored in the memory 12, the server system of the company makes a call to the user's telephone number dialer and the dialer uploads the stored service information data to the server system(uploading process). The server system then compares the data received from the dialer with a standard data built in the system. If the data is correct, the system needs not make further progress. If errors are found, the system start the downloading process to input the standard data into the dialer.

Accordingly, the programming process includes a downloading process of the service information from the server system into the dialer and an uploading process of the stored information from the dialer to the server system.

The memory 12 should be capable of reading and writing for reprogramming and preferably be non-volatile to keep the information in the memory even if power supply is disconnected. Accordingly, E^2PROM is

preferred, which is electrically erasable programmable.

A telephone exchange station always supplies about 48V and from 20 to 120㎃ of electric power through the telephone line. When off-hook condition occurs, the electricity begins to circulate the telephone and the electricity suffers a rapid voltage drop change from 48V to 4V through 20V depending on the resistance of telephones. Since the device is serially connected to the line, the electricity circulates the device at the same time.

When the server system make a phone call to the user's number for on-line programming, a user or an answering machine gets to answer the phone. Accordingly, the dialer detects the off-hook condition and ring signal(s) from the line. To complete the programming process, the line should be seized until the process terminates. As the user answers the call, the server system may transmits a voice announcement of, for example, "the service company starts reprogramming your dialer, so hang on until the programming is completed." When the process terminates, the server system transmits another voice announcement of, for example, "the programming has been completed and hang up."

However, a user may feel uncomfortable or be confused during the "hang on" state. Accordingly, the server system transmits a voice announcement of, for example, "the service company starts reprogramming your dialer, so hang up now" and then the server system issues a commanding code for programming to the dialer. In accordance with the commanding code, the microprocessor 10 actuates the line seizure unit 18 to keep a line connection between the server system and the dialer. The line seizure 18 comprises a relay and a resistor. By turning on the relay, the line seizure loads a resistance to the telephone line at a location nearing the telephone terminal, the resistance value of which is similar to that of the user's telephone. The resistance value ranges from 300Ω to 500Ω.

In the downloading process, the DTMF-tone transceiver 14 receives DTMF signals from the server system and converts them into binary data. If

telephone line is connected to a telephone exchange station of pulse type, the single-tone amplifier 26 amplifies the signals which can be read as binary data by the microprocessor 10. A conventional OP-Amp circuit may be employed as an amplifier.

In the uploading process, the DTMF-tone generator 16 generates and transmits the service information data stored in the memory 12 to the server system through the telephone line. If telephone line is connected to the telephone exchange station of pulse type, the pulse generator 28 generates and transmits pulse signals to the server system through the telephone line.

The downloading and the uploading processes preferably use commanding codes for bilateral communications at each step. Accordingly, the use of the commanding codes between the server system and the device helps the correct programming process and the minimization of time for the process.

Various kind of commanding codes can be used such as single-tones and numerical dual-tones. However, in order to exclude the user from programming the service information by himself, the commanding codes preferably includes codes of A, B and C dual-tone. Since a regular telephone keypad does not have A, B and C keys, the user cannot reprogram the service information at any way by using his telephone.

In accordance with the another aspect of the present invention, there is provided with a dialing device powered through the telephone line comprising: microprocessor means for controlling a programmed operation having a dialing mode and a sleep mode, said dialing mode powering the device to operate, said sleep mode ceasing a supply of power to the device not to operate; ring detector means for detecting ring signals from the telephone line; signal generating means for generating signals responsive to the data input from the microprocessor means; and power supply means for isolating an electric power from the telephone line and powering the device in the dialing mode and ceasing a supply of power to the device not to operate in the sleep mode under the control of the microprocessor means; wherein said power supply

means powers the device in the off-hook and no ring condition in said dialing mode; and wherein said power supply means ceases a supply of power to the device not to operate when the device dials out the number in said sleep mode.

A conventional dialing device often employs an external power supply unit to power the device. Due to the separate external power supply, the dialing device becomes very heavy and expensive.

As noted above, the telephone exchange station supplies about 48V DC of electric power having 20 to 120mA current through the telephone line which can be used as a power source in a dialer.

The dialing device in accordance with the present invention comprises two modes of a dialing mode and a sleep mode, said dialing mode powering the device to operate, said sleep mode ceasing a supply of power to the device not to operate.

When the off-hook condition occurs, the electricity circulates the telephone and the device, and the power supply starts powering the device. In this situation, the microprocessor check on signals from the ring detector 32. If ring comes from the line, the signal applies the 20Hz AC of 65V to 85V to the line. Accordingly, a capacitor in the ring detector charges the electricity and discharges it to the microprocessor. Subsequently, the microprocessor 10 detects there has been ring signal(s) from the telephone line. If ring signal(s) has been detected, the microprocessor determines that the off-hook condition occurred not to make a call by a user but to answer a call from outside; and, therefore, the microprocessor changes its mode into the sleep mode. If there has been no ring signals, the microprocessor determines that the off-hook condition happened because the user tries to make a call. Subsequently, the device change its mode into the dialing mode to await a dial input.

During the off-hook and the no rings condition, the user dials his destination number. The device receives the dial input, processes the number in accordance with the service information stored in the memory, and dials out

the processed number to the telephone.

As soon as the device dials out the processed number, the device changes its mode from the dialing mode into the sleep mode immediately to cause the power supply to cease a supply of power to the device. Accordingly, the device consumes little power when the calling party and a called party talk over the phone and the telephone attached with the dialing device is still high sensitive in spite of the device. When the user hang up the phone, the electricity stops to circulate the line; and, therefore, the device totally does not operate.

Referring to the Fig 2, the power supply comprises a bridge circuit 38, a shutdown circuit 40 and a voltage regulator 42. The shutdown circuit is coupled to the line L1 and the bridge circuit 38 is coupled to the line L2. The bridge circuit 38 having four diodes D1, D2, D3 and D4 depolarize the polarity of the electricity in the line and supplies the electricity of constant polarity to the voltage regulator 42.

As soon as the off-hook condition occurs, the electricity starts powering the power supply. If the microprocessor determines its mode as the programming or dialing mode, a controlling signal from the microprocessor 10 is applied to a thryster SCR3 and a TR3 to turn on. Accordingly, the electricity is applied to the voltage regulator 42 to generate a power driving the device VCC.

If the microprocessor 10 determines its mode as the sleep mode, a controlling signal from the microprocessor 10 is applied to the SCR3 and TR3 to turn off. Accordingly, the electricity circulates the bridge circuit 38 and the shutdown circuit 40. Depending on the polarity of the line; either the left part of shutdown circuit of the TR1 and SCR1 or the right part of the shutdown circuit TR2 and SCR2 forms a loop circuit together with the bridge circuit; and, therefore, the electricity cannot be supplied to the voltage regulator not to power the device.

A capacitor C1 and resistors R1, R2, R3 and R4 divide the voltage of

electricity and protect the left part of the shutdown circuit even when the high voltage of electricity is applied thereto due to the ring signals. In the same way, capacitor C2 and resistors R5, R6, R7 and R8 divide the voltage and protect the right part of the shutdown circuit. A capacitor C3 and a resistor R9 divide the voltage and protect the bridge circuit. Zenor diodes ZD1 and ZD2 regulate the voltage of electricity which is applied to the voltage regulator 42 and the microprocessor 10 respectively.

Still another aspect of the present invention, there is provided with a dialing device powered through the telephone line remotely programmable by way of bilateral communications between the device and a server system of a telephone service company at a remote site comprising; memory means for storing telephone service information; microprocessor means for controlling a programmed operation having a dialing mode, a programming mode and a sleep mode; signal generating means for generating signals responsive to the data input from the microprocessor means in accordance with the service information data; signal transceiver means for receiving signals from the server system and converting the signals into binary data; telephone line seizure means for seizing the telephone line to allow the programming process; and power supply means for isolating an electric power from the telephone line and powering the device in the dialing mode and the programming mode and ceasing a supply of power to the device not to operate in the sleep mode under the control of the microprocessor means; wherein the device receives signals input from a user and dials out the number after processing in accordance with the service information in said dialing mode; wherein said programming mode includes a downloading process of storing the service information data in the memory means from the server system and an uploading process of transmitting the stored data in the memory means to the server system through the telephone line; and wherein the power supply means ceases a supply of power to the device not to operate in said sleep mode.

Referring back to Fig 1, the memory 12 in the device stores telephone service information including access numbers of the server systems of the service companies, a standard table for distinguishing a normal call which should not be processed by the device from a service call which should be processed by the device, user's identification information including a PIN number if any, commanding codes and the like

The microprocessor 10 controls a programmed operation of the device having a dialing mode, a programming mode and a sleep mode.

When the off-hook condition occurred, the electricity in the line starts to circulate the telephone and the device. As soon as the power supply 30 powers the device, the microprocessor 10 checks on the ring detector 32 whether there has been ring signal(s). If no ring has been found, the microprocessor 10 starts the dialing mode. When the device dials out the processed number in accordance with the service information, the microprocessor 10 changes its mode into the sleep mode.

As shown in Fig 2, the power supply comprises the bridge circuit 38, the shutdown circuit 40 and the voltage regulator 42. The power supply unit isolates the electric power from the telephone line and powers the device in the dialing and programming mode under the control of the microprocessor 10 . And, it ceases a supply of power to the device not to operate in the sleep mode by actuating the bridge circuit and the shutdown circuit.

The present dialer preferably further comprises a blocking relay 32 for allowing signals dialed by user not to be transferred to the telephone line directly. If the relay does not block the transfer of the signals during the user's dialing process, the signals are applied to the telephone line directly without any processing in the device.

The operation of the relay is controlled by the microprocessor 10. By turning on the relay, the transfer of signals are blocked and the signals are processed in the device. When the DTMF tones are generated and applied to the telephone line, the signals are blocked by the relay not to make any noise

at the telephone. When the programmed processes are completed, the relay turns off to cause voice signals input by the user to be transferred without any processing by the device.

As soon as the dialer detects the off-hook and no ring conditions, it starts the dialing mode. If the dialer detects the off-hook and ring condition, it starts the sleep mode to allow the signals to by pass the device.

In the dialing mode, the decoder 32 receives signals of the telephone number input by the user and converts the signals into binary codes. The microprocessor 10 receives the binary data and processes the data in accordance with the service information. The microprocessor 10 makes a call to the server, just inserts a prefix number to the data or changers a part of the data, each depending on the kind of service.

The signal generator 16 generates DTMF-tones and transmits the tones to the telephone line. If the line is connected to the telephone exchange station of pulse type, single-tone generator 28 generates and transmits pulse signals to the telephone line. During the dialing mode, the microprocessor 10 turns on the blocking relay 34 so that signals input from the telephone cannot be transferred to the telephone line directly and signals generated from the device cannot be transferred to the telephone 22.

If the microprocessor 10 found ring signal(s) from the line, the microprocessor 10 awaits a commanding code for programming process such as the downloading or the uploading process from the server system. If no commanding code found within the predetermined time for example 5 or 10 seconds, the microprocessor 10 changes its mode into the sleep mode to minimize the energy consumption in the device.

If the microprocessor 10 detects the off-hook condition together with receiving a commanding code for programming from the server system, it changes its mode into the programming mode and performs the programming mode in accordance with the commanding codes for the server system.

The programming mode includes a downloading process of

reprogramming the service information data in the memory and an uploading process of transmitting the service information data stored in the memory to the server system through the telephone line.

When the server system makes a call to the user's telephone number to perform the programming process, a user or an answering machine may answer the phone. In order to carry out the programming process, the line connection should be maintained until the process terminates. Accordingly, the server system transmits a voice announcement for the user to hang on until the programming terminates. Otherwise, the microprocessor 10 actuates the line seizure 18 to seize the line. Then the server system and the device exchanges commanding codes for programming and starts the downloading or the uploading process.

In said sleep mode, the power supply 30 does not power the device and the microprocessor 10 turns on the blocking relay 34 to cause signals to bypass the device. Accordingly, when the calling party and the called party talk over the phone, the operation of the device remains in the sleep mode to minimize the power consumption by the device. This entail minimal effects on the sensitivity of the telephone during the voice conversation.

The signal generator 16 generates signals responsive to the data input from the microprocessor 10. The signal generator 16 or 28 generates the DTMF-tones or single-tones depending on the kind of the telephone exchange equipment connected to the telephone. The signal generator 16 transmits the telephone number data or the service information data stored in the memory 12 to the server system.

The instant dialing device may further comprises a switching unit 36 for selectively allowing signals to bypass the device. When the user turns off the switch manually in a normal condition, the signals transfer between the telephone and the telephone line through the bypass line is blocked. When the user turns on the switch manually in a specific condition, the telephone and the telephone line are directly connected to cause signals to bypass the device.

This bypass switch is very useful when the user does not want to use the telephone service provided by the dialer in some cases due to the changed situation. In particular, when the device is out of order, the user cannot make or answer any call because of malfunction. Under the circumstances, the user turns on the switch to cause a direct connection between the telephone and the telephone line.

The present dialing device may further comprises a generating an imitation sound of ringback tones to the telephone. Whenever the user dials a destination number to make a call, the device saves the number and processes the necessary steps in accordance with service information. Accordingly, the user should wait considerable time to get through to his destination number. The user may be boring or irritated for the connection time.

The connection time to the server system is inevitable in some telephone services. In spite of the necessary connection time, the microprocessor 10 make imitation ringback tone(s) until real ringback tones comes from the telephone line. Since the user can hear ringback tone(s) as soon as he inputs his destination number, the user may not be so boring or irritated although the real connection time remains unchanged.

The device in accordance with the present invention may further comprises a circuit which displays a calling party's telephone number. The circuit is commercially available as a form of one chip(Caller ID chip). Accordingly, the chip containing the circuit for displaying a calling party's telephone number is connected to the microprocessor 10.

It would be better shown in Fig 3 and 4 to understand the progresses of the programming mode. Beginning the program, the dialer is in the on-hook condition which is totally out of power 100. When the server system make a call to the user's telephone number, user or answering machine answers the phone to cause the off-hook condition 102 to occur. By detecting the off-hook condition, the power supply powers the device to operate 104. The device detects no rings from the line, it starts the dialing mode 108.

If the server system makes a call to the telephone number, the device can detects rings. Since the server system and the device are connected through the line, the server system issues a trigger code for programming operation to start the programming mode 110. If the trigger code are not received within the predetermined time, the device starts the sleep mode.

After the microprocessor seizes the line 112, it outputs a code for connection acknowledgement to the server system 114. Subsequently, the device awaits from the server system a code for transmitting the identification information 116. When received, the device outputs the identification information 120. But the code for transmitting the identification information is not received within the predetermined time for example 5 or 10 seconds, the microprocessor determines that the process erred to release the line 118 and detects again an off-hook condition 102.

After outputting the identification information, the device awaits a code for acknowledgement 122. If the code is not received within the predetermined time, the microprocessor releases the line and determines that the process erred to release the line 124. The microprocessor detects again an off-hook condition 102. If the code is received, the device receives a commanding code for downloading or uploading process 126.

Upon receiving the commanding code for downloading, the server system transmits new service information and the device stores the data in the memory 130. In case the code is for uploading, the device transmits its service information data to the server system 128.

Regardless of the downloading or the uploading process, the device issues an end code as soon as the processes terminates 132. Then the device awaits the acknowledgement code from the server system 134. If the acknowledgement code is not received within the prescribed time, the device releases the line and the determines that the process erred 136. The device detects again an off-hook condition 102. If the acknowledgement code is received in time, the device terminates the programming process to release the

line 136 and detects an off-hook condition 102.

Referring to the Fig 5 and 6, the flow of the dialing mode is described. The device is in an on-hook condition from the beginning 140. As soon as the off-hook condition occurs 142, the power supply powers the device to operate 144. Then the microprocessor detects signals from the ring detector that there has been ring signal(s) from the line 146. If detected, the microprocessor awaits a commanding code for programming 148. If the code is received from the server system within the prescribed time, the device starts its programming mode 150. If not received, the device determines that the process erred 148 and detects an off-hook condition 142.

When the microprocessor detects the off-hook and no ring condition, the device changes its mode into the dialing mode and the microprocessor turns off the blocking relay so that the dial input from the telephone does not transferred to the telephone line 152.

Thereafter, the microprocessor awaits the dial input from the user 154 and saves the data in RAM memory built therein 156. If the dial input is not received within the predetermined time for example 5 or 10 seconds 158, the device determines that the process erred to release the line 158 and detects an off-hook condition 142.

The microprocessor compares the received telephone number data with the standard table in the memory to determine whether it falls on a service call or not 160. When determined as the service call, the device make a call to the server system by using the access number thereof stored in the memory 162. If not determined as a service call, the microprocessor generates signals as stored in the RAM memory to transmit DTMF-tones to the telephone line 164. Thereafter, the device changes its mode into the sleep mode by ceasing a supply of power to the device 166.

When the device is successfully connected to the server as for the service call, it awaits an acknowledgement code from the server system 168. If the device receives the acknowledgement code, the device dials out the

destination telephone number as stored in the RAM memory 170. If the device does not receive the acknowledgement code within the predetermined time, the device determines that the process erred to release the line 172 and detects on off-hook condition 142.

Based on the destination number transmitted from the device, the server system makes a call via its predetermined route to the destination number. If the server system finally gets ringback tones, the device gets to receive the ringback tones 174. As soon as the device receives the ringback tones, the microprocessor turns off the blocking relay to cause a direct connection between the telephone and the telephone line and changes its mode into sleep mode 178. If the device cannot receive ringback tones within the prescribed time, the device determines that the process erred 176 to release the line and detects an off-hook condition 142.

As soon as the called party hangs up the phone after his conversation over the phone, the device is totally out of power. Accordingly, the sleep mode naturally terminates and the device detects an off-hook condition.

As illustrated, the server system and the device communicates each other in the respective steps during the downloading or uploading processes. However, a part of communicating commanding codes are not always necessary to process the programmed operation. It is noted that the exchange of commanding codes can conveniently be set up for the server and the device by the telephone service company. However, the exchange of commanding codes generally promotes the next step of the progresses; and, therefore, the connection time to get the destination number can be minimized.

Yet another aspect of the present invention, there is provided a method for automatically dialing a programmed number comprising: detecting an off-hook condition and no ring signal(s) from the telephone line; decoding signals of a destination number input from a telephone by a user into binary data; storing the binary data; determining the stored data to be a normal call which should not be processed and a service call which should be processed

to use a telephone service provided by a user's preferred telephone service company; generating signals responsive to the stored telephone number as input by the user in case of a normal call; connecting the server system and generating signals responsive to the number processed in accordance with the service information in case of a service call.

Since a user must hang on to make a call, the off-hook condition is first detected in accordance with the present invention. When detected, the device is powered to actuate and each steps proceed in sequence.

The destination number input from a telephone by the user is applied to the encoder and converted into binary data. The digital data is then input to the microprocessor 10 and stored in the RAM memory.

The programmed service information preferably include access numbers of the server systems of the service companies, a standard table for distinguish a normal call from a service call, user's identification information including a PIN number if any, commanding codes and the like.

The service information may include more than two access numbers of the server systems if the company cannot cover specific areas. As for the specific areas which the company cannot cover, the company provides other access number of other server system which can cover such areas.

Depending on areas, a certain kind of telephone service(for example, internet phone service) has an advantage over other kind of service(for example, prepaid calling service). In these cases, the telephone service company makes the service information stored in the device to access the best way to reach the destination number.

If determined as a service call, the device make a call to the predetermined server system. When the server system and the device are connected to process the service call, the server system issues commanding codes that the device sends back the identification information to the server. The server system determines whether the identification information received from the device is correct or not. If determined correct, the server system

issues a commanding code for transmitting the destination number.

Upon receiving the commanding codes, the device transmits the processed number to the server system to get the destination number.

The method further comprises a downloading the service information to change the stored service information and an uploading the stored service information to the server system to confirm an accuracy of the stored service information by the server system.

While the invention has been described with reference to preferred embodiments, it should be apparent to those skilled in the art that many changes and modifications may be made without departing from the spirit and scope of the invention as described in the claims.

WHAT IS CLAIMED IS:

1. A dialing device remotely programmable by way of bilateral communications between the device and a server system of a telephone service company at a remote location comprising;

memory means for storing telephone service information data prepared by the service company;

signal transceiver means for receiving signals from the server system through the telephone line and converting the received signals into binary data;

microprocessor means for controlling a programmed process including a downloading process of storing or changing the service information data in the memory means transmitted from the server system and an uploading process of transmitting the stored data in the memory means to the server system through the telephone line;

telephone line seizure means for seizing the telephone line to allow the programming process; and

signal generating means for generating signals responsive to the data input from the microprocessor means.

2. The dialing device of claim 1, wherein said telephone service information comprises a standard table for distinguishing a telephone number data which should not be processed from a service call which should be processed to use a telephone service provided by a user's preferred telephone company, access numbers of the server systems, user's identification information including a PIN number if any, commanding codes for controlling the operation of the device, and commanding codes for bilateral communications between the device and the server system.

3. The dialing device of claim 2, wherein said commanding codes for

bilateral communications comprises A, B and C dual-tones.

4. The dialing device of claim 1, wherein said memory means for storing the service information comprises non-volatile memory means capable of reading and writing.

5. The dialing device of claim 4, wherein said non-volatile memory means comprises an E^2PROM memory.

6. The dialing device of claim 5, wherein said telephone line seizure means including a resistor and a relay loads a resistance to the telephone line by turning on the relay, the resistance value of which is similar to that of telephone.

7. The dialing device of claim 1, wherein said signal transceiver means comprises DTMF-tone transceiver means to receive signal from a DTMF type telephone exchange equipment and single-tone transceiver means to receive signals from a single-tone type telephone exchange equipment.

8. The dialing device of claim 1, wherein said signal generating means comprises DTMF-tone generator means and single-tone generator means.

9. A dialing device powered through the telephone line comprising:

microprocessor means for controlling a programmed operation having a dialing mode and a sleep mode, said dialing mode powering the device to operate, said sleep mode ceasing a supply of power to the device not to operate;

ring detector means for detecting ring signals from the telephone line;

signal generating means for generating signals responsive to the data input from the microprocessor means; and

power supply means for isolating an electric power from the telephone line and powering the device in the dialing mode and ceasing a supply of power to the device not to operate in the sleep mode under the control of the microprocessor means;

wherein said power supply means powers the device in the off-hook and no ring condition in said dialing mode; and

wherein said power supply means ceases a supply of power to the device not to operate when the device dials out the number.

10. The telephone dialing device of claim 9, wherein said power supply means comprises a bridge circuit, a shutdown circuit and a voltage regulator.

11. The telephone dialing device of claim 10, wherein said bridge circuit and the shutdown circuit make a loop circuit not to supply the power to the device.

12. A dialing device powered through the telephone line remotely programmable by way of bilateral communications between the device and a server system of a telephone service company at a remote site comprising;

memory means for storing telephone service information;

microprocessor means for controlling a programmed operation having a dialing mode, a programming mode and a sleep mode;

signal generating means for generating signals responsive to the data input from the microprocessor means in accordance with the service information data;

signal transceiver means for receiving signals from the server system and converting the signals into binary data;

telephone line seizure means for seizing the telephone line to allow the programming process; and

power supply means for isolating an electric power from the telephone

line and powering the device in the dialing mode and the programming mode and ceasing a supply of power to the device not to operate in the sleep mode under the control of the microprocessor means;

wherein the device receives signals input from a user and dials out the number after processing in accordance with the service information in said dialing mode;

wherein said programming mode includes a downloading process of storing the service information data in the memory means from the server system and an uploading process of transmitting the stored data in the memory means to the server system through the telephone line; and

wherein the power supply means ceases a supply of power to the device not to operate.

13. The dialing device of claim 12, further comprising a blocking relay for blocking a transfer of signals input by user to the telephone line directly and signals generated by the generator means back to the telephone.

14. The dialing device of claim 12, further comprising bypass switching means wherein output line of the telephone is directly connected or disconnected the telephone line by turning on or off the switching means at a user's option.

15. The dialing device of claim 12, further comprising a circuit for displaying calling party's telephone number.

16. The dialing device of claim 12, further comprising generating an imitation sound of ringback tones to the telephone so that a user can hear the imitation ringback tones.

17. A method for automatically dialing a programmed number comprising:

detecting an off-hook condition and no ring signal(s) from the telephone line;

decoding signals of a destination number input from a telephone by a user into binary data;

storing the binary data;

determining the stored data to be a normal call which should not be processed and a service call which should be processed to use a telephone service provided by a user's preferred telephone service company;

generating signals responsive to the stored telephone number as input by the user in case of a normal call;

connecting the server system and generating signals responsive to the number processed in accordance with the service information in case of a service call.

18. The method of claim 17, said programmed service information include an access number of the server system and identification information of the user including a PIN number if any.

19. The method of claim 17, further comprising generating and receiving commanding codes for each step of processing the service call.

20. The method of claim 17, further comprising a downloading the service information to change the stored service information and an uploading the stored service information to the server system.

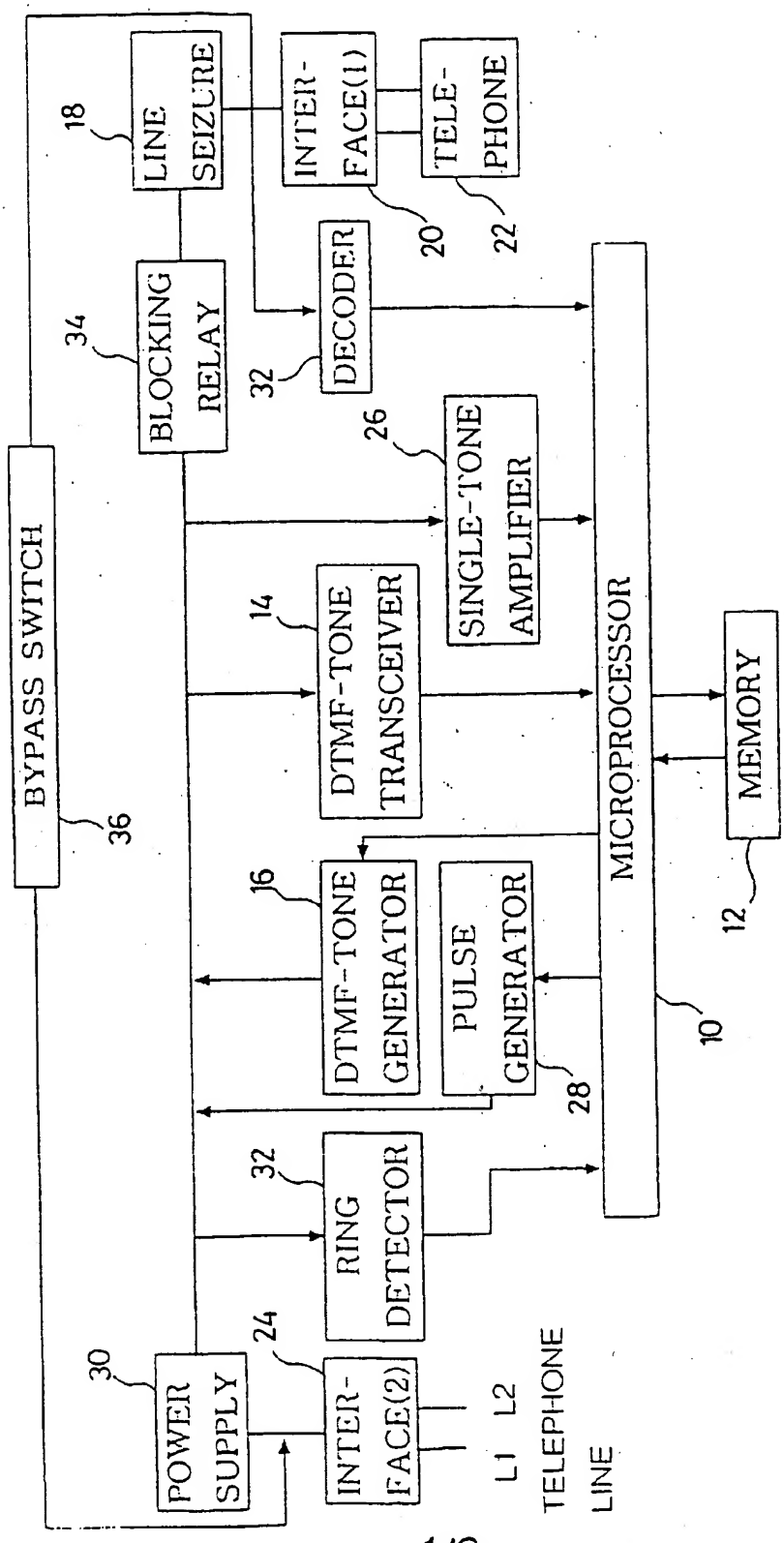
BYPASS SWITCH
36
POWER SUPPLY
30
INTER-FACE(2)
24
L1 L2
TELEPHONE LINE
RING DETECTOR
32
DTMF-TONE GENERATOR
16
PULSE GENERATOR
28
DTMF-TONE TRANSCEIVER
14
SINGLE-TONE AMPLIFIER
26
MICROPROCESSOR
10
MEMORY
12
BLOCKING RELAY
34
LINE SEIZURE
18
DECODER
32
INTER-FACE(1)
20
TELE-PHONE
22

FIG 1

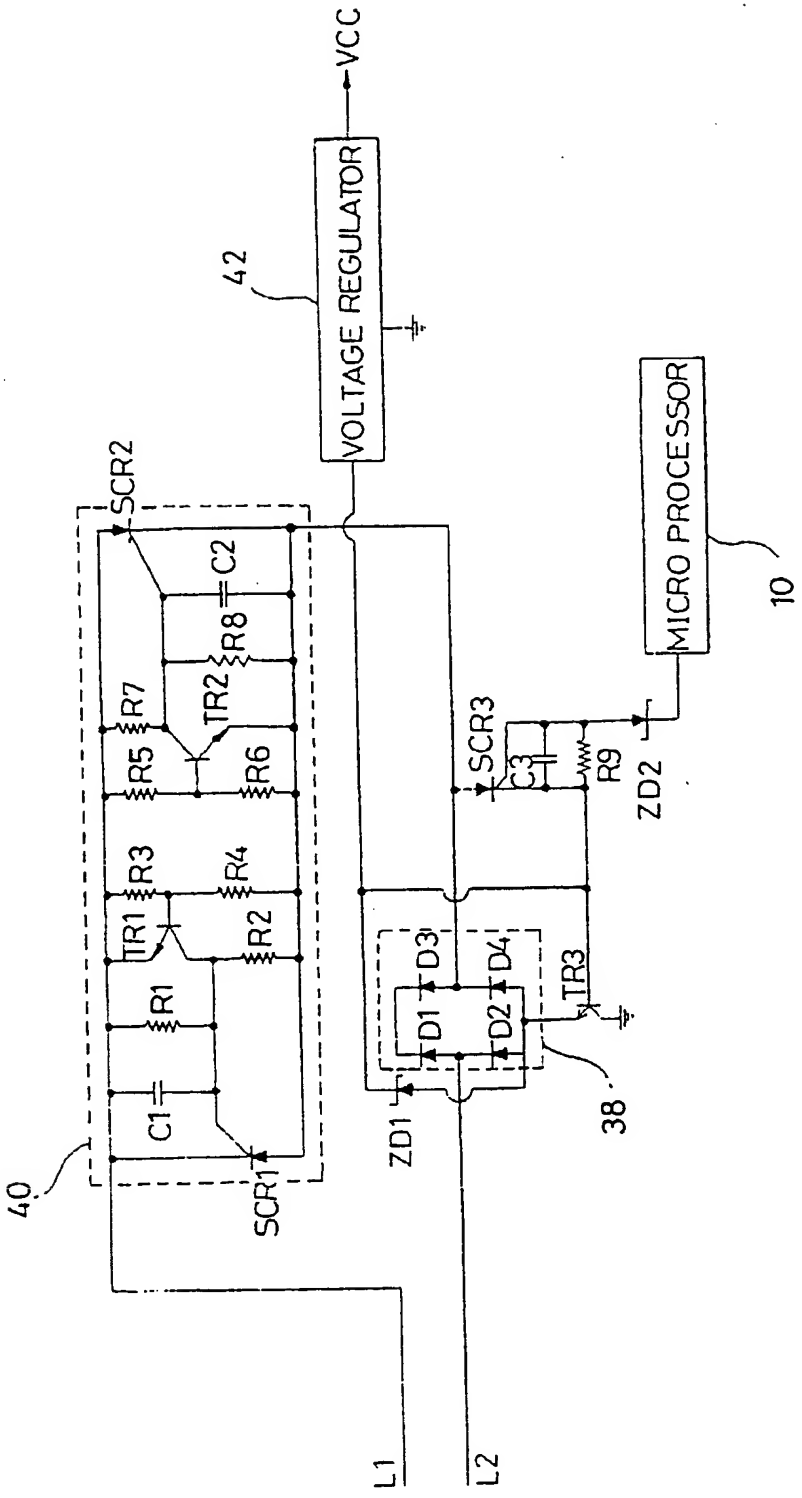
VCC
VOLTAGE REGULATOR
42
MICRO PROCESSOR
10
SCR2
C2
R8
TR2
R7
R5
R6
R3
R4
TR1
R2
R1
C1
SCR1
40
SCR3
C3
R9
ZD2
D3
D4
D1
D2
TR3
ZD1
38
L1
L2

FIG 2

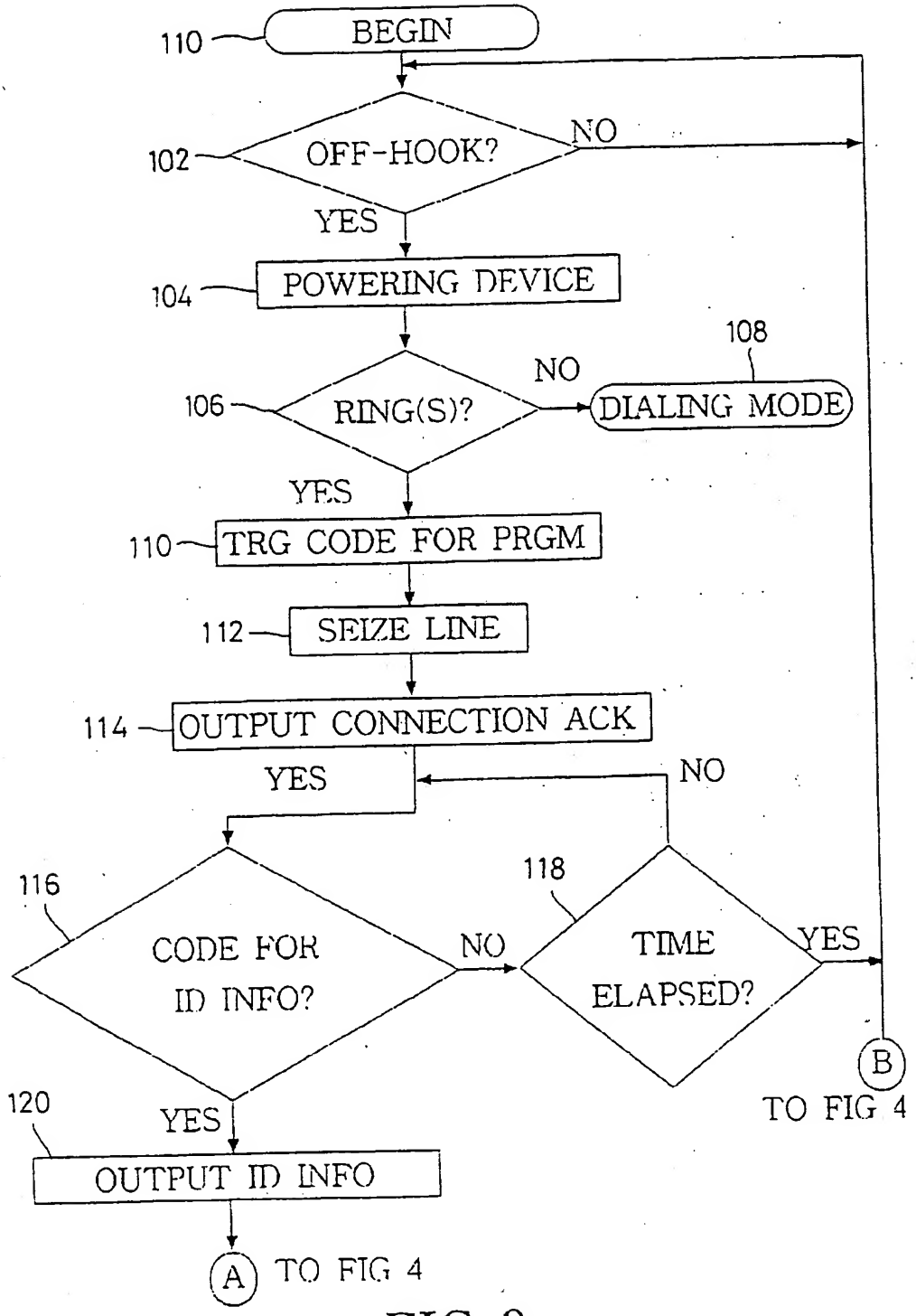
110
BEGIN
102
OFF-HOOK?
NO
YES
104
POWERING DEVICE
108
106
RING(S)?
NO
DIALING MODE
YES
110
TRG CODE FOR PRGM
112
SEIZE LINE
114
OUTPUT CONNECTION ACK
YES
NO
116
CODE FOR ID INFO?
NO
118
TIME ELAPSED?
YES
B
TO FIG 4
120
YES
OUTPUT ID INFO
A
TO FIG 4

FIG 3

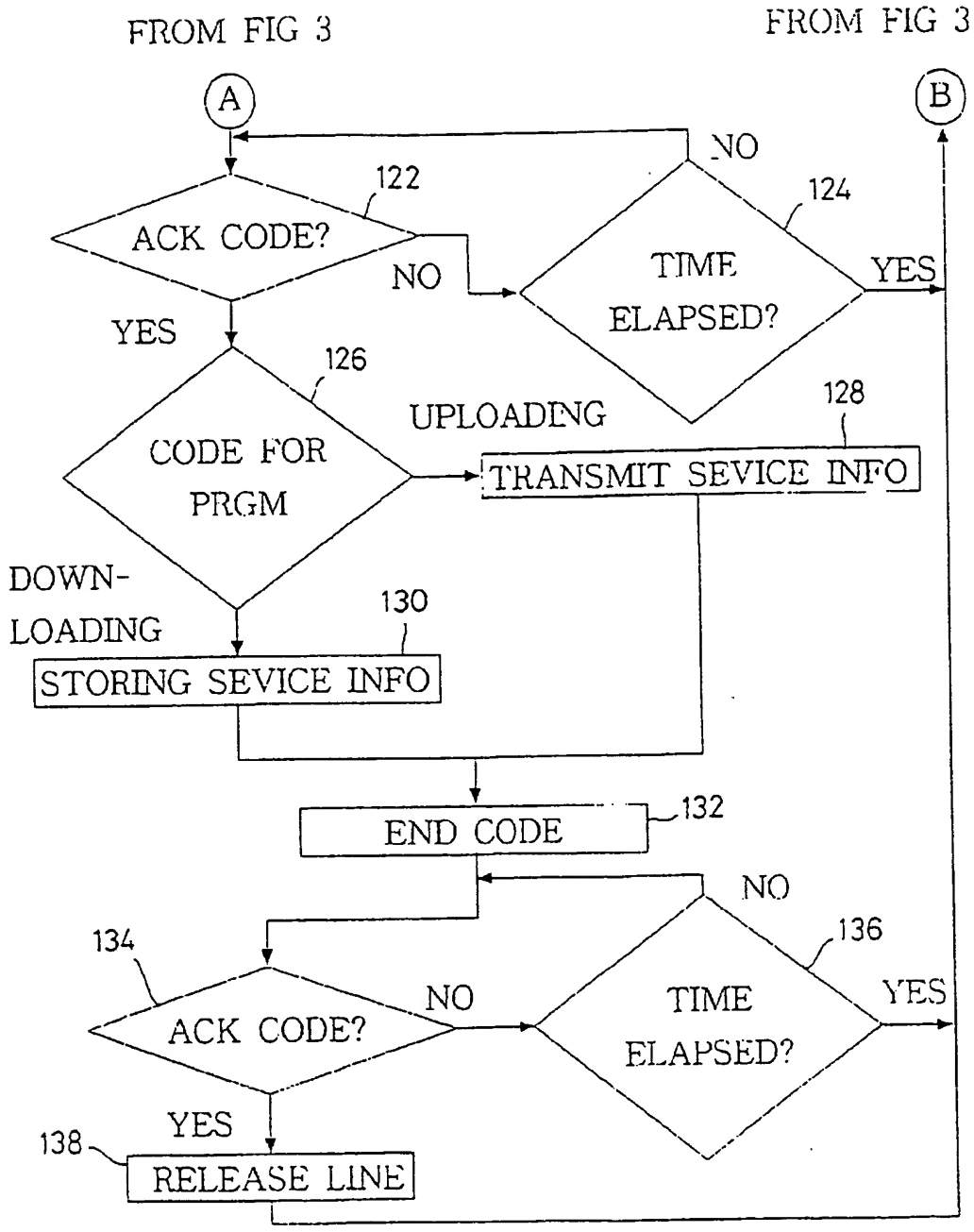
FROM FIG 3
FROM FIG 3
A
B
122
ACK CODE?
NO
124
TIME ELAPSED?
NO
YES
YES
126
CODE FOR PRGM
UPLOADING
128
TRANSMIT SEVICE INFO
DOWN-LOADING
130
STORING SEVICE INFO
END CODE
132
NO
134
ACK CODE?
NO
136
TIME ELAPSED?
YES
YES
138
RELEASE LINE

FIG 4

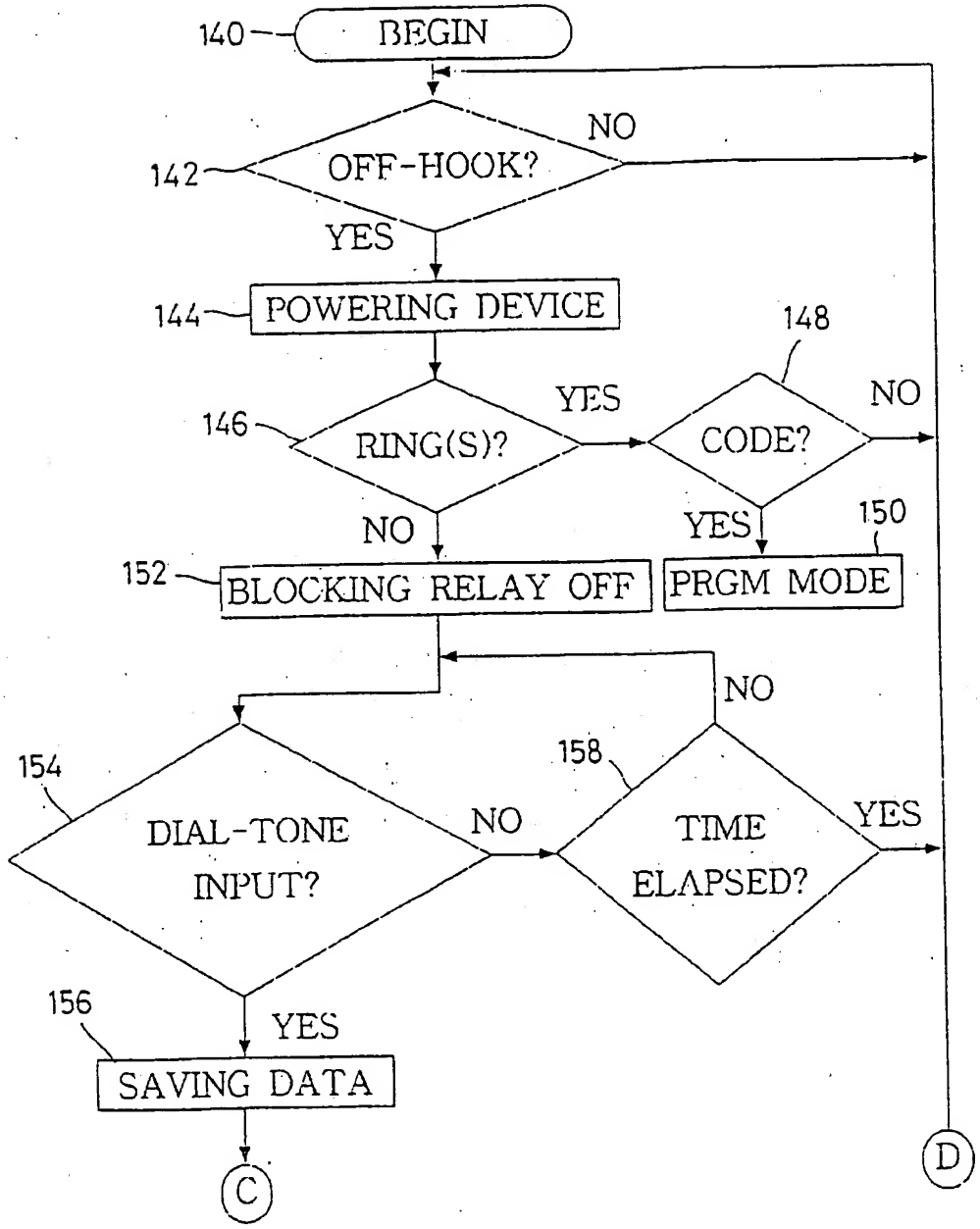
140
BEGIN
142
OFF-HOOK?
NO
YES
144
POWERING DEVICE
146
RING(S)?
YES
148
CODE?
NO
YES
150
PRGM MODE
NO
152
BLOCKING RELAY OFF
NO
154
DIAL-TONE INPUT?
NO
158
TIME ELAPSED?
YES
156
YES
SAVING DATA
C
D
TO FIG 6
TO FIG 6

FIG 5

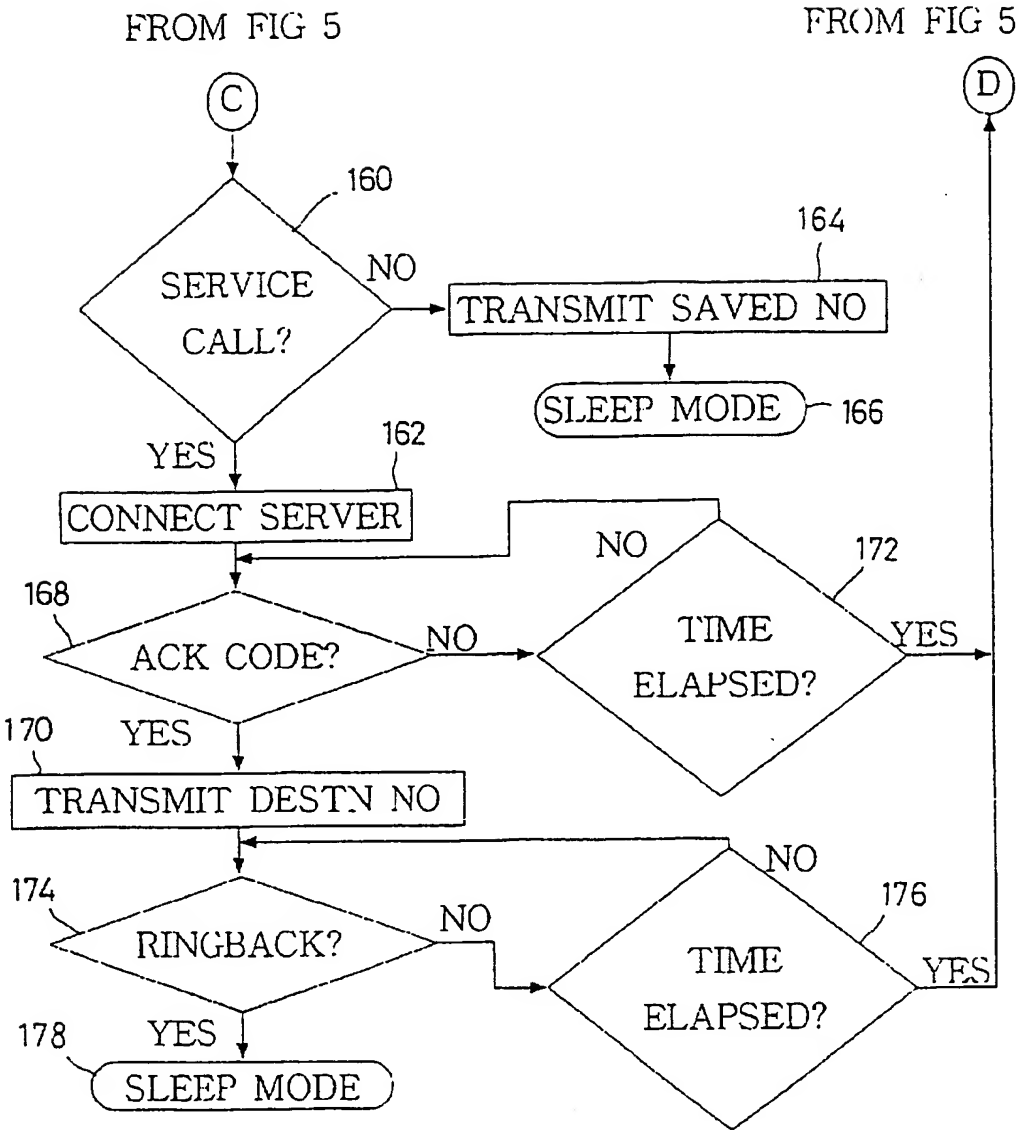
FROM FIG 5
FROM FIG 5
C
D
160
SERVICE CALL?
NO
164
TRANSMIT SAVED NO
SLEEP MODE
166
YES
162
CONNECT SERVER
NO
172
168
ACK CODE?
NO
TIME ELAPSED?
YES
170
YES
TRANSMIT DESTN NO
NO
174
RINGBACK?
NO
176
TIME ELAPSED?
YES
178
YES
SLEEP MODE

FIG 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR 97/00193

A. CLASSIFICATION OF SUBJECT MATTER

IPC[6]: H 04 Q 7/20

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC[6]: H 04 Q 7/00, 7/20, 7/22, 7/34; H 04 M 11/00, 17/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPIL

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 96/22 652 A1 (ELONEX) 25 July 1996 (25.07.96), abstract; page 1, line 1 - page 5, line 14; fig.1,2,4; claim 1.	1,9,12,17
A	US 5 521 960 A (ARONOW) 28 May 1996 (28.05.96), totality.	1,9,12,17
A	WO 88/10 039 A1 (HATHCOCK) 15 December 1988 (15.12.88).	

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
30 January 1998 (30.01.98)	05 February 1998 (05.02.98)

Name and mailing address of the ISA/AT	Authorized officer
AUSTRIAN PATENT OFFICE Kohlmarkt 8-10 A-1014 Vienna	Grössing
Facsimile No. 1/53424/535	Telephone No. 1/53424/386

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/KR 97/00193

Im Recherchenbericht angeführtes Patentdocument Patent document cited in search report Document de brevet cité dans le rapport de recherche	Datum der Veröffentlichung Publication date Date de publication	Mitglied(er) der Patentfamilie Patent family member(s) Membre(s) de la famille de brevets	Datum der Veröffentlichung Publication date Date de publication
WO A1 9622652	25-07-96	EP A1 800742	15-10-97
US A 5521960	28-05-96	keine - none - rien	
WO A1 8810039	15-12-88	US A 4852146	25-07-89

Form PCT/ISA/210 (patent family annex) (July 1992)